

WHAT IS CLAIMED IS:

1. A host device couplable to a remote device via a single wire pair,
2 said single wire pair comprising a first wire and a second wire, said remote
device comprising first remote signal generation circuitry operable to
4 generate a first remote signal and a first remote current modulator operable
to modulate a current component of a power signal present on said single
6 wire pair with said first remote signal when said first remote signal is
communicated to said host device, said host device comprising:
8 a voltage reference and control loop circuit which generates and
enforces a substantially constant voltage component of said power signal
10 present on said single wire pair during communication of said first remote
signal to said host device; and
12 a first host current de-modulator operable to de-modulate said first
remote signal from said current component of said power signal present on
14 said single wire pair during communication of said first remote signal to said
host device.

2. A host device in accordance with claim 1, wherein:
2 said voltage reference and control loop circuit comprises:
a voltage generator which generates a substantially constant
4 reference voltage during communication of said first remote signal to
said host device;
6 an operational amplifier having a first input terminal coupled to
receive said reference voltage, a second input terminal coupled to
8 said first wire, a feedback resistor coupled between said output
terminal and said second input terminal, and an output terminal which
10 outputs an operational amplifier output voltage signal that reflects a
current that is passing through said feedback resistor, wherein said
12 operational amplifier operates to mirror said reference voltage
received at said first input terminal on said second input terminal; and
14 said first host current de-modulator comprises:
a filter which filters said operational amplifier output voltage
16 signal to recover said first remote signal.

3. A host device in accordance with claim 2, comprising:
2 host signal generation circuitry operable to generate a host signal;
a host current modulator operable to modulate said current
4 component of said power signal present on said single wire pair with said
host signal while said voltage reference and control loop circuit enforces a
6 substantially constant voltage component of said power signal present on
said single wire pair during communication of said host signal to said remote
8 device;
wherein said remote device comprises:
10 a remote current de-modulator operable to de-modulate said host
signal from said current component of said power signal present on said
12 single wire pair during communication of said host signal to said remote
device.

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4. A host device in accordance with claim 1, comprising:
2 host signal generation circuitry operable to generate a host signal;
a host current modulator operable to modulate said current
4 component of said power signal present on said single wire pair with said
host signal while said voltage reference and control loop circuit enforces a
6 substantially constant voltage component of said power signal present on
said single wire pair during communication of said host signal to said remote
8 device;
wherein said remote device comprises:
10 a remote current de-modulator operable to de-modulate said host
signal from said current component of said power signal present on said
12 single wire pair during communication of said host signal to said remote
device.

5. A host device in accordance with claim 1, wherein:
2 said remote device comprises second remote signal generation
circuitry operable to generate a second remote signal and a second remote
4 current modulator operable to modulate said current component of said

power signal present on said single wire pair with said second remote signal
6 during communication of said second remote signal to said host device; and
said host device comprises:

8 a second host current de-modulator operable to de-modulate said
second remote signal from said current component of said power signal
10 present on said single wire pair during communication of said second remote
signal to said host device;

12 wherein said voltage reference and control loop circuit enforces a
substantially constant voltage component of said power signal present on
14 said single wire pair during communication of said second remote signal to
said host device.

6. A host device in accordance with claim 5, wherein:

2 said voltage reference and control loop circuit comprises:

a voltage generator which generates a substantially
4 constant reference voltage during communication of said first
remote signal to said host device;

6 an operational amplifier having a first input terminal
coupled to receive said reference voltage, a second input
8 terminal coupled to said first wire, a feedback resistor coupled
between said output terminal and said second input terminal,
10 and an output terminal which outputs an operational amplifier
output voltage signal that reflects a current that is passing
12 through said feedback resistor, wherein said operational
amplifier operates to mirror said reference voltage received at
14 said first input terminal on said second input terminal;

said first host current modulator comprises:

16 a filter which filters said operational amplifier output
voltage signal to recover said first remote signal; and

18 said second host current de-modulator comprises:

a filter which filters said operational amplifier output voltage
20 signal to recover said second remote signal.

7. A host device in accordance with claim 3, wherein:

2 said remote device comprises second remote signal generation
circuitry operable to generate a second remote signal and a second remote
4 current modulator operable to modulate said current component of said
power signal present on said single wire pair with said second remote signal
6 during communication of said second remote signal to said host device; and
 said host device comprises:
8 a second host current de-modulator operable to de-modulate said
second remote signal from said current component of said power signal
10 present on said single wire pair during communication of said second remote
signal to said host device;
12 wherein said voltage reference and control loop circuit enforces a
substantially constant voltage component of said power signal present on
14 said single wire pair during communication of said second remote signal to
said host device.

8. A host device in accordance with claim 7, wherein:

2 said voltage reference and control loop circuit comprises:
 a voltage generator which generates a substantially
4 constant reference voltage during communication of said first
remote signal to said host device;
6 an operational amplifier having a first input terminal
coupled to receive said reference voltage, a second input
8 terminal coupled to said first wire, a feedback resistor coupled
between said output terminal and said second input terminal,
10 and an output terminal which outputs an operational amplifier
output voltage signal that reflects a current that is passing
12 through said feedback resistor, wherein said operational
amplifier operates to mirror said reference voltage received at
14 said first input terminal on said second input terminal;
 said first host current modulator comprises:
16 a filter which filters said operational amplifier output
voltage signal to recover said first remote signal; and
18 said second host current de-modulator comprises:

20 a filter which filters said operational amplifier output voltage
signal to recover said second remote signal.

9. A host device in accordance with claim 1, comprising:
2 host signal generation circuitry operable to generate a host signal;
a host voltage modulator operable to modulate said voltage
4 component of said power signal present on said single wire pair with said
host signal during communication of said host signal to said remote device;
6 wherein said remote device comprises:
a remote voltage de-modulator operable to de-modulate said host
8 signal from said voltage component of said power signal present on said
single wire pair during communication of said host signal to said remote
10 device.

10. A host device in accordance with claim 9, wherein:
2 said voltage reference and control loop circuit comprises:
a voltage generator which generates a substantially constant
4 reference voltage during communication of said first remote signal to
said host device;
6 an operational amplifier having a first input terminal coupled to
receive said reference voltage, a second input terminal coupled to
8 said first wire, a feedback resistor coupled between said output
terminal and said second input terminal, and an output terminal which
10 outputs an operational amplifier output voltage signal that reflects a
current that is passing through said feedback resistor, wherein said
12 operational amplifier operates to mirror said reference voltage
received at said first input terminal on said second input terminal; and
14 said first host current de-modulator comprises:
a filter which filters said operational amplifier output voltage signal to
16 recover said first remote signal.

11. A host device in accordance with claim 9, wherein:
2 said remote device comprises second remote signal generation
circuitry operable to generate a second remote signal and a second remote

4 current modulator operable to modulate said current component of said
power signal present on said single wire pair with said second remote signal
6 during communication of said second remote signal to said host device; and
said host device comprises:
8 a second host current de-modulator operable to de-modulate said
second remote signal from said current component of said power signal
10 present on said single wire pair during communication of said second remote
signal to said host device;
12 wherein said voltage reference and control loop circuit enforces a
substantially constant voltage component of said power signal present on
14 said single wire pair during communication of said second remote signal to
said host device.

12. A host device in accordance with claim 11, wherein:
2 said voltage reference and control loop circuit comprises:
a voltage generator which generates a substantially
4 constant reference voltage during communication of said first
remote signal to said host device;
6 an operational amplifier having a first input terminal
coupled to receive said reference voltage, a second input
8 terminal coupled to said first wire, a feedback resistor coupled
between said output terminal and said second input terminal,
10 and an output terminal which outputs an operational amplifier
output voltage signal that reflects a current that is passing
12 through said feedback resistor, wherein said operational
amplifier operates to mirror said reference voltage received at
14 said first input terminal on said second input terminal;
said first host current de-modulator comprises:
16 a filter which filters said operational amplifier output voltage
signal to recover said first remote signal; and
18 said second host current de-modulator comprises:
a filter which filters said operational amplifier output voltage signal to
20 recover said second remote signal..

13. A host device couplable to a remote device via a single wire pair,
2 said single wire pair comprising a first wire and a second wire, said remote
device comprising first remote signal generation circuitry operable to
4 generate a first remote signal and a first remote current de-modulator
operable to de-modulate a host signal from a current component of a power
6 signal present on said single wire pair when said host signal is
communicated to said remote device, said host device comprising:
8 a voltage reference and control loop circuit which enforces a
substantially constant voltage component of said power signal present on
10 said single wire pair during communication of said first remote signal to said
host device; and
12 host signal generation circuitry operable to generate said host signal;
a host current modulator operable to modulate said current
14 component of said power signal present on said single wire pair with said
host signal while said voltage reference and control loop circuit enforces a
16 substantially constant voltage component of said power signal present on
said single wire pair during communication of said host signal to said remote
18 device.

14. A host device in accordance with claim 13, wherein:
2 said voltage reference and control loop circuit comprises:
a voltage generator which generates a substantially
4 constant reference voltage during communication of said first
remote signal to said host device;
6 an operational amplifier having a first input terminal coupled to
receive said reference voltage, a second input terminal coupled to
8 said first wire, a feedback resistor coupled between said output
terminal and said second input terminal, and an output terminal which
10 outputs an operational amplifier output voltage signal that reflects a
current that is passing through said feedback resistor, wherein said
12 operational amplifier operates to mirror said reference voltage
received at said first input terminal on said second input terminal.

15. A host device in accordance with claim 14, comprising:

2 a first host current de-modulator operable to de-modulate a first
remote signal from said current component of said power signal present on
4 said single wire pair during communication of said first remote signal to said
host device;
6 wherein said remote device comprises:
first remote signal generation circuitry operable to generate said first
8 remote signal;
a first remote current modulator operable to modulate said current
10 component of said power signal present on said single wire pair with said
first remote signal while said voltage reference and control loop circuit
12 enforces a substantially constant voltage component of said power signal
present on said single wire pair during communication of said first remote
14 signal to said host device.

16. A host device in accordance with claim 13, comprising:
2 a first host current de-modulator operable to de-modulate a first
remote signal from said current component of said power signal present on
4 said single wire pair during communication of said first remote signal to said
host device;
6 wherein said remote device comprises:
first remote signal generation circuitry operable to generate
8 said first remote signal;
a first remote current modulator operable to modulate said current
10 component of said power signal present on said single wire pair with said
first remote signal while said voltage reference and control loop circuit
12 enforces a substantially constant voltage component of said power signal
present on said single wire pair during communication of said first remote
14 signal to said host device.

17. A host device in accordance with claim 16, wherein:
2 said first host current de-modulator comprises:
a filter which filters said operational amplifier output voltage signal to
4 recover said first remote signal.

18. A host device in accordance with claim 13, wherein:

2 said remote device comprises second remote signal generation
circuitry operable to generate a second remote signal and a second remote
4 current modulator operable to modulate with said second remote signal said
current component of said power signal present on said single wire pair
6 during communication of said second remote signal to said host device; and
 said host device comprises:

8 a second host current de-modulator operable to de-modulate said
second remote signal from said current component of said power signal
10 present on said single wire pair during communication of said second remote
signal to said host device;

12 wherein said voltage reference and control loop circuit enforces a
substantially constant voltage component of said power signal present on
14 said single wire pair during communication of said second remote signal to
said host device.

19. A host device in accordance with claim 18, wherein:

2 said voltage reference and control loop circuit comprises:

 a voltage generator which generates a substantially constant
4 reference voltage during communication of said first remote signal to
said host device;

6 an operational amplifier having a first input terminal coupled to
receive said reference voltage, a second input terminal coupled to
8 said first wire, a feedback resistor coupled between said output
terminal and said second input terminal, and an output terminal which
10 outputs an operational amplifier output voltage signal that reflects a
current that is passing through said feedback resistor, wherein said
12 operational amplifier operates to mirror said reference voltage
received at said first input terminal on said second input terminal;
14 said first host current de-modulator comprises:

 a filter which filters said operational amplifier output voltage
16 signal to recover said first remote signal; and
 said second host current de-modulator comprises:

18 a filter which filters said operational amplifier output voltage signal to
recover said second remote signal.

20. A host device in accordance with claim 16, wherein:

2 said remote device comprises second remote signal generation
circuitry operable to generate a second remote signal and a second remote
4 current modulator operable to modulate said current component of said
power signal present on said single wire pair with said second remote signal
6 during communication of said second remote signal to said host device; and
said host device comprises:

8 a second host current de-modulator operable to de-modulate said
second remote signal from said current component of said power signal
10 present on said single wire pair during communication of said second remote
signal to said host device;

12 wherein said voltage reference and control loop circuit enforces a
substantially constant voltage component of said power signal present on
14 said single wire pair during communication of said second remote signal to
said host device.

21. A host device in accordance with claim 20, wherein:

2 said voltage reference and control loop circuit comprises:

4 a voltage generator which generates a substantially constant
reference voltage during communication of said first remote signal to
said host device;

6 an operational amplifier having a first input terminal coupled to
receive said reference voltage, a second input terminal coupled to
8 said first wire, a feedback resistor coupled between said output
terminal and said second input terminal, and an output terminal which
10 outputs an operational amplifier output voltage signal that reflects a
current that is passing through said feedback resistor, wherein said
12 operational amplifier operates to mirror said reference voltage
received at said first input terminal on said second input terminal;
14 said first host current de-modulator comprises:

16 a filter which filters said operational amplifier output voltage
signal to recover said first remote signal; and
said second host current de-modulator comprises:
18 a filter which filters said operational amplifier output voltage signal to
recover said second remote signal.

22. A method for channeling signals between a host device and a
2 remote device, said host device and said remote device connected by a
single wire pair comprising a first wire and a second wire, and said host
4 device supplying a power signal comprising a current component and a
voltage component to said remote device over said single wire pair, said
6 method comprising:
at said host device, holding said voltage component of said power
8 signal present on said wire pair substantially constant;
at said remote device, generating a remote signal;
10 at said remote device, current-modulating said remote signal with said
current component of said power signal present on said wire pair; and
12 at said host device, de-modulating said current component of said power
signal present on the wire pair to recover said remote signal.

23. A method in accordance with claim 22, said method further
2 comprising the steps of:
at said host device, generating a host signal;
4 at said host device, current-modulating said host signal with said
current component of said power signal present on said wire pair; and
6 at said remote device, de-modulating said current component of said power
signal present on said wire pair to recover said host signal.

24. A method in accordance with claim 22, said method further
2 comprising the steps of:
at said host device, generating a host signal;
4 at said host device, voltage-modulating said host signal with said
voltage component of said power signal present on said wire pair; and

6 at said remote device, de-modulating said voltage component of said power
signal present on said wire pair to recover said host signal.

25. A method in accordance with claim 22, said method further
2 comprising the steps of:
at said remote device, generating a second remote signal;
4 at said remote device, current-modulating said second remote signal
with said current component of said power signal present on said wire pair;
6 and
at said host device, de-modulating said current component of said power
8 signal present on the wire pair to recover said second remote signal.

26. A method in accordance with claim 23, said method further
2 comprising the steps of:
at said remote device, generating a second remote signal;
4 at said remote device, current-modulating said second remote signal
with said current component of said power signal present on said wire pair;
6 and
at said host device, de-modulating said current component of said power
8 signal present on the wire pair to recover said second remote signal.

27. A method in accordance with claim 24, said method further
2 comprising the steps of:
at said remote device, generating a second remote signal;
4 at said remote device, current-modulating said second remote signal
with said current component of said power signal present on said wire pair;
6 and
at said host device, de-modulating said current component of said power
8 signal present on the wire pair to recover said second remote signal.

28. A method for channeling signals between a host device and a
2 remote device, said host device and said remote device connected by a
single wire pair comprising a first wire and a second wire, and said host
4 device supplying a power signal comprising a current component and a

voltage component to said remote device over said single wire pair, said
6 method comprising:
at said host device:
8 holding said voltage component of said power signal present
on said wire pair substantially constant;
10 generating a host signal; and
current-modulating said host signal with said current
12 component of said power signal present on said wire pair; and
at said remote device:
14 de-modulating said current component of said power signal
present on the wire pair to recover said host signal.

29. A method in accordance with claim 28, said method further
2 comprising the steps of:
at said remote device:
4 generating a first remote signal;
current-modulating said first remote signal with said current
6 component of said power signal present on said wire pair; and
at said host device:
8 de-modulating said current component of said power signal
present on the wire pair to recover said first remote signal.

30. A method in accordance with claim 29, said method further
2 comprising the steps of:
at said remote device:
4 generating a second remote signal;
current-modulating said second remote signal with said current
6 component of said power signal present on said wire pair; and
at said host device:
8 de-modulating said current component of said power signal present
on the wire pair to recover said second remote signal.

31. A voltage reference and power loop control circuit for supplying
2 power and channeling signals from a remote device over a single wire pair,

said single wire pair comprising a first wire and a second wire, said remote
4 device operable to modulate a current component of a power signal present
on said single wire pair with a remote signal, said circuit comprising:
6 a voltage generator which generates a reference voltage;
an operational amplifier having a first input terminal coupled to receive
8 said reference voltage, a second input terminal coupled to said first wire, a
feedback resistor coupled between said output terminal and said second
10 input terminal, and an output terminal which outputs an operational amplifier
output voltage signal that reflects a current that is passing through said
12 feedback resistor, wherein said operational amplifier operates to mirror said
reference voltage received at said first input terminal on said second input
14 terminal; and
a filter which filters said operational amplifier output voltage signal to
16 recover said remote signal.